

## Once is Enough

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The strong men of Titan, Saturn's largest moon, consider repetition to be a sin. However, they only have 3 sounds that they can make "Kah", "Brrrr", and "Umph" (Let's call them K, B and U for short.) so it is sometimes difficult not to repeat.



Image from Start Trek III courtesy of [www.ex-astris-scientia.org/gallery.htm](http://www.ex-astris-scientia.org/gallery.htm)

What the strong men of Titan mean by repetition is any sequence of sounds that *immediately* follows the same sequence... so

UBUBUKUBUKBKUBUKBUKU

is not a sinful utterance because of this:

UBUBUKUBUKBKUBUKBUKU

but is a sinful utterance because of this:

UBUBUKUBUKBKUBUKBUKU

Can the strong men of Titan make 20 sounds in a row without sinning?

**Extensions:**

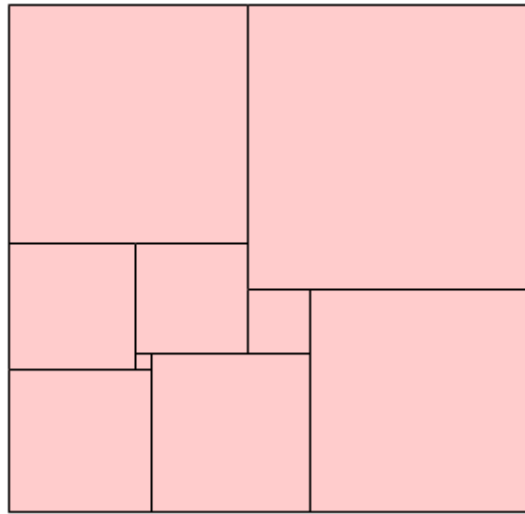
The strong men of Titan want to tile their enormous (infinite) rooms of their palace following the same principal.

How many different rectangles do they need to tile the floor of one room so that no two identical rectangles touch along an edge?

Can they tile a room with 2 sizes of equilateral triangles so that no two identical triangles touch along an edge?

How many different equilateral triangles do they need to tile a room if no two may touch along an edge or at a point? [Hint](#)

How many different squares do they need to tile a room if no two may touch along an edge or at a point? (I don't know the answer, but without thinking too much about it, I do have an upper bound of nine based on the following rectangle:)



These nine squares have sides  
1, 4, 7, 8, 9, 10, 14, 15, and 18.

**Credits:**

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